Electronic Version
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# Claims

[c1] 1.A television (TV) tuner comprising:
a first preamp stage for amplifying and filtering a received RF signal within a first frequency range;
a second preamp stage for amplifying and filtering the received RF signal within a second frequency range;
a first mixer being selectively coupled to either the first preamp stage or the second preamp stage according to a mode selection signal for generating a first intermediate-frequency signal;
a first band-pass filter being selectively coupled to the first mixer according to the mode selection signal for filtering the first intermediate-frequency signal;
a second band-pass filter being selectively coupled to the first mixer according to the mode selection signal for filtering the first intermediate-frequency signal; and
a second stage being coupled to the first band-pass filter and the second band-pass filter for generating an output signal.

[c2] 2. The TV tuner of claim 1, further comprising a first local oscillator for providing a first local oscillating signal to the first mixer, wherein the frequency of the first local

oscillating signal is variable and is determined according to the frequency range of the received RF signal.

[c3] 3. The TV tuner of claim 2, wherein the first mixer is a harmonic mixer and the first local oscillating signal further includes a first reference signal and a second reference signal being the first reference signal phase shifted by 90 degrees.

[c4] 4.The TV tuner of claim 1, wherein the second stage includes a second mixer for mixing the first intermediate-frequency signal to generate a second intermediate-frequency signal.

[c5] 5. The TV tuner of claim 4, further comprising a second local oscillator for providing a second local oscillating signal to the second mixer, wherein the frequency of the second local oscillating signal is fixed and is determined according to the frequency range of the received RF signal.

[c6] 6. The TV tuner of claim 5, wherein the second mixer is a harmonic mixer and the second local oscillating signal further includes a third reference signal and a fourth reference signal, the fourth reference signal being the third reference signal phase shifted by 90 degrees.

[c7] 7.The TV tuner of claim 1, wherein the second stage in-

cludes a second mixer for mixing the first intermediate-frequency signal to generate an in-phase baseband signal and a third mixer for mixing the first intermediate-frequency signal to generate a quadrature-phase baseband signal.

[c8] 8.The TV tuner of claim 7, wherein the second stage further includes a second local oscillator for providing a third local oscillating signal to the second mixer and a fourth local oscillating signal to the third mixer, wherein the frequency of the third and the fourth local oscillating signals is fixed and is determined according to the frequency range of the received RF signal and the fourth local oscillating signal is the third local oscillating signal phase shifted by 90 degrees.

[c9] 9. The TV tuner of claim 8, wherein the second and the third mixers are harmonic mixers, the third local oscillating signal further includes a fifth reference signal and a sixth reference signal, and the fourth local oscillating signal further includes a seventh reference signal and a eighth reference signal, wherein the sixth reference signal is the fifth reference signal phase shifted by 90 degrees, the seventh reference signal is the fifth reference signal phase shifted by 45 degrees, and the eighth reference signal is the fifth reference signal phase shifted by 135 degrees.

[c10] 10.A method of processing a received RF signal by a TV tuner, wherein the received RF signal is in at least one of a first frequency range and a second frequency range, the method comprising the following steps:
pre-amplifying and filtering the received RF signal to form a pre-amplified signal;
selectively mixing the pre-amplified signal with a first local oscillating signal to produce a first intermediate frequency signal, wherein the frequency of the first local oscillating signal is variable and is determined according to the frequency range of the received RF signal;
filtering the first intermediate frequency to form a filtered intermediate signal; and
selectively mixing the filtered intermediate signal with a second local oscillating signal to produce an output signal, wherein the frequency of the second local oscillating signal is fixed and is determined according to the frequency range of the received RF signal.

[c11] 11.The method of claim 10, wherein the output signal is a second intermediate frequency signal.

[c12] 12.The method of claim 10, wherein the output signal includes an in-phase baseband signal and a quadrature-phase baseband signal.